

RADIOLOGY CORNER

Elbow Synovial Fold Syndrome

Guarantor: CPT Amit Sanghi, USA, MC FS

Contributors: CPT Amit Sanghi, USA, MC FS¹; MAJ Justin Q. Ly, USAF, MC^{2,3}; 2LT R. Joel Bush, USA, MSC³; COL Les R. Folio, USAF, MC, SFS³

Note: This is the full text version of the radiology corner question published in the November 2007 issue, with the abbreviated answer in the December 2007 issue.

We present the case of a 17 year old female with elbow synovial fold syndrome (aka plica synovialis). The etiology is thought to be related to repetitive microtrauma resulting in thickening of normal elbow synovial folds. Associated symptoms typically worsen over time, particularly with increasing exercise and motion. While radiographs are unrevealing, MR imaging will show a thickened plica, oftentimes with secondary signs of plica impingement. The following report reviews presentation, pathophysiology, characteristic imaging findings and current treatment options for elbow synovial fold syndrome.

Introduction

Elbow synovial fold syndrome, also known as plica syndrome of the elbow or elbow plica synovialis, is a condition of the elbow which is common among athletes. It is thought to be caused from repeated impingement of redundant synovial folds. For the patient, this causes pain and a foreign body sensation of snapping or clicking. This type of syndrome has been well documented for the knee, but now is being recognized more often in the elbow [1,2]. We present the case of a 17 year old female with clinical and MR imaging evidence of this condition and provide a comprehensive review of the limited peer-reviewed literature.

History

A 17 year old female cheerleader reports experiencing acute left elbow pain while performing gymnastics maneuvers during recent practice sessions. The patient describes pain along the lateral aspect of the elbow and a sensation of “catching” during range of motion exercises. On physical examination, full extension of elbow was noted to cause worsening of pain and a very small joint effusion was suspected on palpation. Elbow radiography was initially obtained, followed subsequently by elbow MR imaging. At

the time of this case write-up, a conservative management approach had been introduced, to include rest and activity modification with a plan for the patient to follow up for further evaluation to include consideration of arthroscopic surgery, if symptoms recur.

Summary of Imaging Findings

There were no positive plain radiography findings; pertinent negatives included absence of loose bodies, significant joint effusion, or osteochondral defect. The workup of this condition often ceases here, with no further imaging. In this case, an MR imaging study was ordered to evaluate for suspected condylar injury. The MRI revealed a thickened posterolateral plica with a component interposed between the posterior capitellum and radial head (Fig. 1). Subchondral edema was present on both sides of the articulation (Fig. 2). The constellation of clinical symptoms and imaging findings are compatible with elbow synovial fold syndrome.

Discussion

Elbow synovial fold syndrome (in contradistinction to a similar process in the knee [1,2,3,4]), has been reported sparsely in peer-reviewed literature. This syndrome is common amongst athletes, particularly throwing athletes [1-9] and golfers [11]. Classic symptoms for elbow synovial fold syndrome include pain with repetitive motion, particularly flexion and extension movements. Affected patients commonly describe a feeling of “catching” or “snapping”, with locking in extension also frequently reported. Swelling may or may not be present and pain is usually localized to the lateral aspect of the elbow. Often, patients have recurring symptoms over lengthy periods of time. Treatments including rest, nonsteroidal anti-inflammatory medications, and steroid injections may be attempted; however, conservative therapy may fail to adequately provide long-term symptomatic relief [1-8].

Anatomically, patients with synovial fold syndrome of the elbow have a thickened and inflamed synovial plica that falls between the capitellum and radial head. Impingement of this

¹ Battalion Flight Surgeon, 1st US Support Battalion, Multinational Force and Observers, Sinai, Egypt

² Wilford Hall Medical Center, Lackland AFB, TX

³ Uniformed Services University of the Health Sciences, Bethesda, MD

Reprint & Copyright © by Association of Military Surgeons of U.S., 2006.

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE DEC 2007		2. REPORT TYPE		3. DATES COVERED 00-00-2007 to 00-00-2007	
4. TITLE AND SUBTITLE Elbow Synovial Fold Syndrome				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Uniformed Services University of the Health Sciences, Department of Radiology and Radiological Sciences, 4301 Jones Bridge Road, Bethesda, MD, 20814				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 3	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			



Fig. 1a. Sagittal Proton Density MR of the elbow shows a prominent triangular low to intermediate signal structure consistent with a mildly thickened synovial fold, interposed between the posterior articular surfaces of the radial head and capitellum.

plica is what causes pain and locking [2,3,5,7]. Simply stated, plicae are prominent folds of normal synovial membrane [1,4]. Normal synovial membranes are thin and pliable. With chronic synovitis, the membranes become thick and fibrotic. Histologic findings of excised plicae include chronic hypertrophic fibrous synovitis. Thickened plicae may be seen at MR imaging in both symptomatic and asymptomatic patients. In patients without this syndrome, additional findings of edema or inflammation are not present.

In the first reported cases of this syndrome, diagnosis was made by arthroscopy after the patient had failed all non-operative management [8]. The arthroscopic procedure revealed a thickened band of synovium extending from the radial head to the humerus that would become pinched or trapped in the radiocapitellar joint on extension of the elbow. Currently, the diagnosis is made by clinical and imaging findings.

Radiologic evaluation typically begins with plain film radiography which is often nonspecific or normal. Other modalities include CT arthrography, MRI, and MR arthrography, with the latter nearing 100% sensitivity for diagnosing plica syndrome, thus becoming the modality of choice. Common MR arthrographic findings include significantly thickened synovial fold (plica) extending from the posterior fat pad.



Fig. 1b, Sagittal Proton Density MR with arrows

The clinical differential diagnosis of plica syndrome includes lateral epicondylitis (aka tennis elbow), loose bodies, osteoarthritis, and snapping triceps tendon. Lateral epicondylitis appears to be the leading mis-diagnosis before proper imaging or arthroscopy is performed and the hypertrophied synovial band is discovered. Although this syndrome is often misdiagnosed, crepitus, snapping, and locking are uncommonly seen in epicondylitis [3,8]. MR arthrography allows exclusion of intra-articular loose bodies [1,6,9,10].

Currently, the leading theory as to why these anatomically present folds become hypertrophic and inflamed is repetitive microtrauma, which causes inflammation through cytokine mediated factors [2,4,5]. Pathologic reports point to chronic inflammation with an acute component superimposed. Often orthopedic surgeons will elect to arthroscopically remove enlarged synovial folds with the goal of eliminating symptoms and preventing future recurrence [1-9]. Surgical intervention is the definitive treatment of choice and the only known cure as studies have shown that a majority of patients' symptoms improve or even resolve with resection of the abnormal plicae [8].

Note: Follow this link for Category 1 CME or CNE in the case of the week in the MedPix™ digital teaching file.

<http://rad.usuhs.mil/amsus.html>

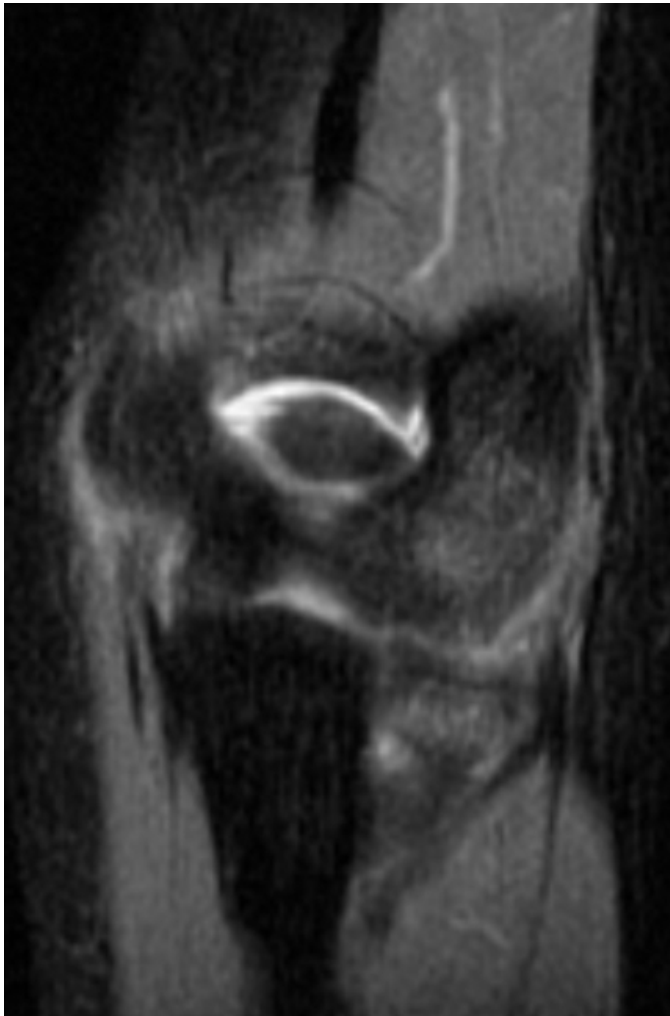


Fig 2(A). Coronal STIR MR image of the elbow shows bone marrow edema on both sides of the radio-capitellar articulation, related to chronic impingement of the fold between the radial and capitellum. The thickened synovial fold is ill-defined and increased in signal intensity.



Fig 2(A). Coronal STIR MR image with outlines depicting the bone marrow edema. The thickened synovial fold is ill-defined and increased in signal intensity.

References

1. Awaya et al. Elbow Synovial Fold Syndrome: MR Imaging Findings. *American Journal of Roentgenology* 2001; 177:1377-1381.
2. Akagi M, Nakamura T. Snapping elbow caused by the synovial fold in the radiohumeral joint. *J Shoulder Elbow Surg* 1998;7:427-9.
3. Clarke, R. Symptomatic, Lateral Synovial Fringe (Plica) of the Elbow Joint. *The J of Arthroscopic and Related Surgery* 1988;4(2):112-6.
4. Jee W-H, Choe B-Y, Kim J-M, Song H-H, Choi K-H. The Plica Syndrome: Diagnostic Value of MRI with Arthroscopic Correlation. *J Comput Assist Tomogr* 1998;22(5):814-8.
5. Sakai K, Kanamori M, Kitano S. Extension restriction of the elbow caused by a synovial fold-a report on 2 athletes. *Acta Orthop Scand* 1999;70(1):85-86.
6. Quinn et al. Evaluation of loose bodies in the Elbow with MR imaging. *Journal of Magnetic Resonance Imaging* 1994 Mar-Apr;4(2):169-72.
7. Commandre F.A, Taillan B, Benezis C, Follacci F.M., Hammou J.C. Plica synovialis (synovial fold) of the Elbow: Report on one case. *The Journal of Sports and Medicine and Physical Fitness* 1988;28:209-10.
8. McFarland E, Gill H, Laporte D, Streiff M. Miscellaneous conditions about the elbow in athletes. *Clin Sports Med* 2004;23:743-763.
9. Dupare F, Putz R, Michot C, Muller J-M, Freger P. The synovial fold of the humeroradial joint: anatomical and histological features, and clinical relevance in lateral epicondylalgia of the elbow. *Surgical and Radiologic Anatomy* 2002;24:302-7.
10. Cotton A, Jacobson J, Brossmann J, Hodler J, Trudell D, Resnick D. MR Arthrography of the Elbow: Normal Anatomy and Diagnostic Pitfalls. *J Comput Assist Tomography* 1997;21(4):516-22.
11. Kim DH et al. Arthroscopic treatment of posterolateral elbow impingement from lateral synovial plicae in throwing athletes and golfers. *Am J Sports Med*. 2006 Mar;34(3):438-44. Epub 2005 Dec 19.